

THAT WHICH IS CLAIMED IS:

1. An isolated polynucleotide encoding DsrA, the polynucleotide selected from the group consisting of:
 - 5 (a) DNA having the nucleotide sequence of **SEQ ID NO:1**;
 - (b) DNA having the nucleotide sequence selected from the group consisting of **SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, and SEQ ID NO:17**;
 - (c) polynucleotides that hybridize to DNA of (a) or (b) above under
10 stringent conditions and which encode DsrA; and
 - (d) polynucleotides that differ from the DNA of (a) or (b) or (c) above due to the degeneracy of the genetic code, and that encode DsrA encoded by a DNA of (a) or (b) above.
- 15 2. An isolated polynucleotide according to Claim 1 that encodes DsrA.
3. An isolated polynucleotide that encodes DsrA, wherein the DsrA has the amino acid sequence given herein as **SEQ ID NO:2**.
- 20 4. An isolated polynucleotide that encodes DsrA, wherein the DsrA has and amino acid sequence selected from the group of **SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, and SEQ ID NO:18**.
- 25 5. An isolated polynucleotide according to Claim 1 which is a DNA having the nucleotide sequence given herein as **SEQ ID NO:1**.
6. An isolated protein encoded by a polynucleotide according to Claim 1.
- 30 7. An isolated and purified protein having the amino acid sequence selected from the group consisting of **SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, and SEQ ID NO:18**.

8. An expression vector comprising a polynucleotide according to Claim 1.
9. A cell containing an expression vector according to Claim 8.
- 5 10. A cell containing an expression vector according to Claim 8 and capable of expressing DsrA.
11. An antibody that specifically binds to a protein encoded by a polynucleotide according to Claim 1.
- 10 12. An antibody according to Claim 11, wherein said antibody is a polyclonal antibody.
13. An antibody according to Claim 11, wherein said antibody is a monoclonal
- 15 antibody.
14. An antisense oligonucleotide complementary to a polynucleotide of Claim 1 and having a length sufficient to hybridize thereto under physiological conditions.
- 20 15. A DNA encoding an antisense oligonucleotide of Claim 14.
16. An expression vector comprising an antisense oligonucleotide according to Claim 14.
- 25 17. A method for producing a protein comprising the amino acid sequence selected from the group consisting of **SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, and SEQ ID NO:18**, or a fragment thereof, comprising
- 30 (a) culturing a host cell containing an expression vector containing at least a fragment of a polynucleotide sequence encoding DsrA under conditions suitable for the expression of the protein; and
- (b) recovering the protein from the host cell culture.

18. A method for detecting a polynucleotide which encodes DsrA in a biological sample comprising:
- (a) hybridizing the complement of the polynucleotide sequence which
5 encodes a polynucleotide selected from the group consisting of **SEQ ID NO:1**, **SEQ ID NO:3**, **SEQ ID NO:5**, **SEQ ID NO:7**, **SEQ ID NO:9**, **SEQ ID NO:11**, **SEQ ID NO:13**, **SEQ ID NO:15**, and **SEQ ID NO:17** to nucleic acid material of a biological sample, thereby forming a hybridization complex; and
- (b) detecting the hybridization complex, wherein the presence of the
10 complex correlates with the presence of a polynucleotide encoding DsrA in the biological sample.
19. The mutant *H. ducreyi* strain FX517, wherein the mutant does not encode or express DsrA.
- 15 20. A vaccine composition comprising purified protein DsrA or a fragment thereof in a pharmaceutically acceptable carrier.
21. A vaccine composition of Claim 20 further comprising another outer
20 membrane protein of *H. ducreyi*.
22. A vaccine according to Claim 20 further comprising an adjuvant
23. A vaccine composition comprising a polynucleotide of Claim 1 in a
25 pharmaceutically acceptable carrier.
24. A vaccine composition according to Claim 34 wherein the polynucleotide has the sequence **SEQ ID NO:1**.
- 30 25. A vaccine composition comprising an expression vector of Claim 8 in a pharmaceutically acceptable carrier.

26. A vaccine composition comprising the *H. ducreyi* mutant FX517 in a pharmaceutically acceptable carrier.

27. A DNA vaccine comprising an attenuated *H. ducreyi* strain.

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28. A method for inducing a protective immune response in a subject at risk of developing *H. ducreyi* infection comprising administering to the subject a vaccine according to one of Claims 20–27 in an amount sufficient to induce an immune response.

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